



Military Munitions Response Program Remedial Investigation

February 6, 2014



Military Munitions Response Program

Munitions Response Sites



| Munitions Response Site (MRS) | AEDB-R ID | Area |
|--|------------------|----------------------|
| 1926 Explosion Radius | PICA-003-R-01 | 1,544 acres |
| 1926 Explosion Radius - Off-Post | PICA-004-R-01 | 838 acres |
| Shell Burial Grounds | PICA-010-R-01 | 5.7 acres |
| Green Pond | PICA-005-R-01 | 1.1 acres |
| Former Operational Areas | PICA-006-R-01 | 1,880 acres |
| Lakes MRS | PICA-008-R-01 | 741 acres |
| Lake Denmark - Off-Post | PICA-012-R-01 | 113 acres |
| Inactive Munitions Waste Pit | PICA-013-R-01 | 21 acres |
| Inactive Munitions Waste Pit - Off-Post | PICA-014-R-01 | 39 acres |
| | TOTAL | 5,182.8 acres |

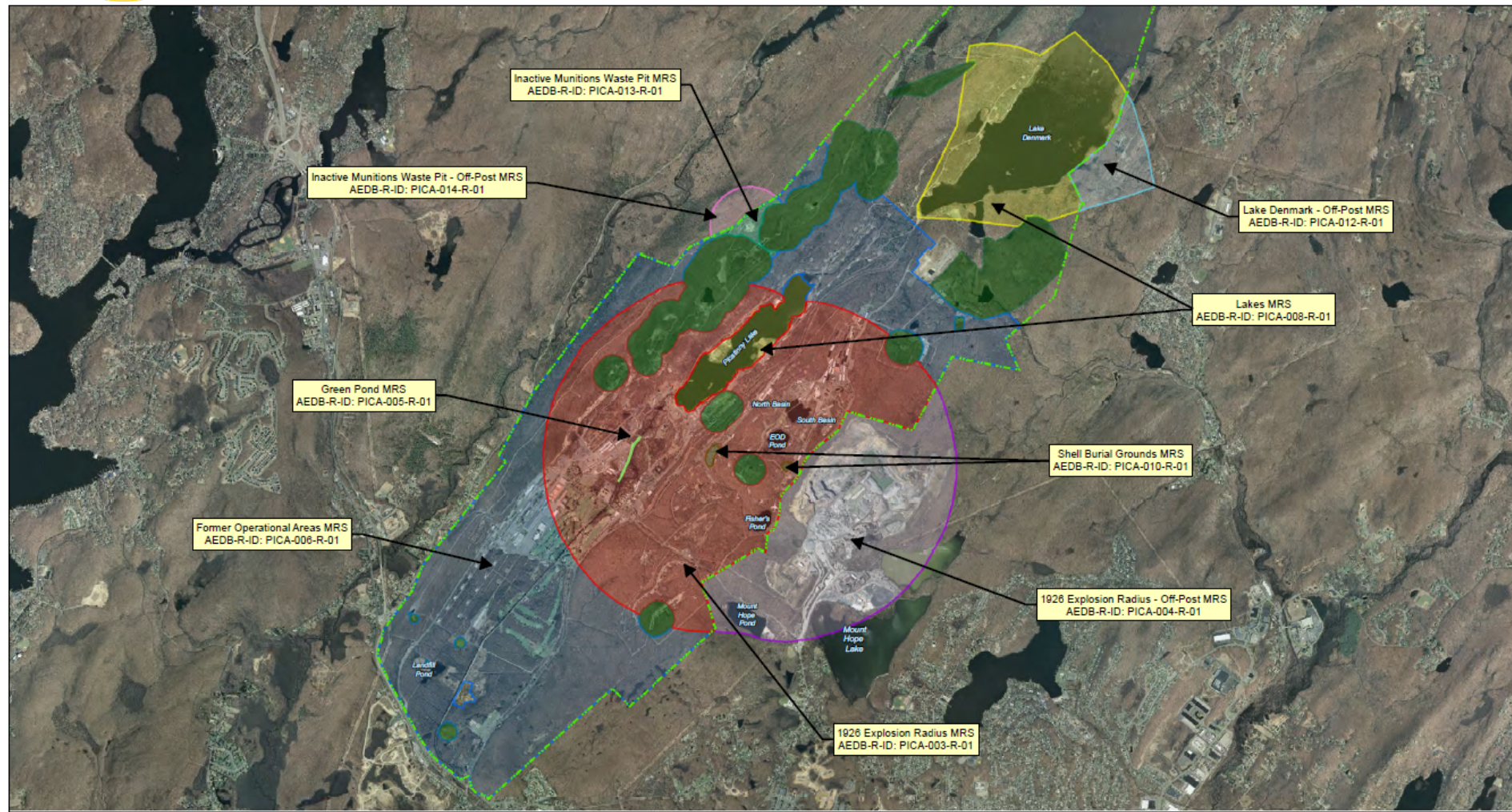


Military Munitions Response Program

Munitions Response Sites



Picatinny
Arsenal



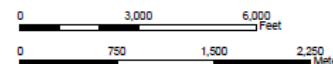
| Legend | |
|--------|---|
| | Installation Boundary |
| | Operational Range Areas |
| | Munitions Response Sites |
| | 1926 Explosion Radius |
| | 1926 Explosion Radius - Off-Post |
| | Former Operational Areas |
| | Green Pond |
| | Inactive Munitions Waste Pit |
| | Inactive Munitions Waste Pit - Off-Post |
| | Lake Denmark - Off-Post |
| | Lakes |
| | Shell Burial Grounds |

NOTES:
Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)
Coordinate System: UTM Zone 18N
Datum: WGS84. Units: Feet

Picatinny Arsenal
Morris County,
New Jersey



Figure 1-2
Location of
Munitions Response Sites



Created By: CLR
Verified By: NAS
Approved By: RSS

10/14/2013 Contract # W913DR-09-D-0006
DO 0002
File: Y:\Picatinny\MXD\RI_Sep2012\AIRTC\MRS_Loc.mxd



Military Munitions Response Program Investigation Summary



- A statistical characterization strategy was developed for each MRS based on their respective conceptual site models (CSM).
- Analog and digital geophysical mapping (DGM) surveys (terrestrial and underwater) were performed along pre-planned transects and at grids based on the investigation approach.
- Anomalies detected during the geophysical surveys were intrusively investigated.
- Intrusive investigation results were tracked and tabulated for assessment during the RI.
- MC sampling was conducted based on intrusive investigation results.





Military Munitions Response Program

Investigation Summary



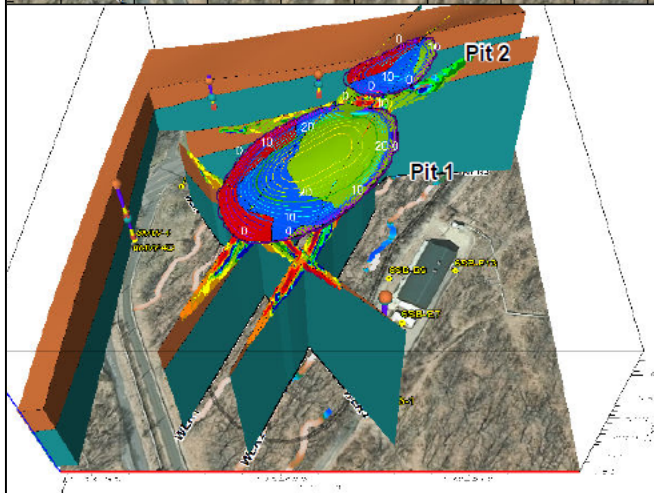
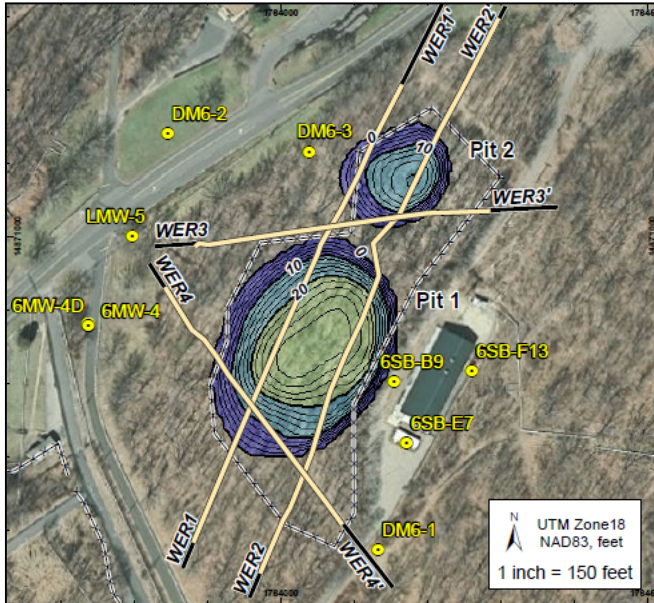
| MRS | Geophysical Survey Coverage | | | | | | Anomalies Investigated | Quantity of MEC | Quantity of MD |
|--|-----------------------------|------------------------|-------------------------------|-----------------------|----------------------|----------------------|------------------------|-----------------|----------------|
| | Transect Approach | | | | Grid Approach | | | | |
| | Mag & Dig (ft) | DGM (ft) | Analog Detection Density (ft) | ER (ft) | Mag & Dig | DGM | | | |
| 1926 Explosion Radius and 1926 Explosion Radius - Off-Post | - | - | 13,844 | - | 93 grids/ 5.33 acres | 39 grids/ 2.23 acres | 2,928 | 14 | 973 |
| Shell Burial Grounds | - | 15,313 | - | 4,660 | - | - | 0 | 0 | 0 |
| Green Pond Brook | 2,160 | 2,703 | - | - | - | - | 562 | 0 | 58 |
| Former Operational Area | 218,910 | 70,650 | 13,443 | - | 1 grid/ 0.05 acres | 7 grids/ 0.4 acres | 3,194 | 75 | 444 |
| Lakes | 78,837 | 31,439 | - | - | - | 2 grids/ 0.82 acres | 268 | 2 | 44 |
| Inactive Munitions Waste Pit | 830 | 6,163 | 3,020 | - | 1 grid/ 0.05 acres | - | 14 | 0 | 1 |
| Inactive Munitions Waste Pit - Off-Post | 6,780 | - | - | - | - | - | 6 | 0 | 4 |
| Lake Denmark - Off-Post | - | - | 30,817 | - | - | - | 0 | 0 | 0 |
| Project Total | 307,517 ft or 58 miles | 126,268 ft or 24 miles | 61,124 ft or 11 miles | 4,660 ft or 0.9 miles | 95 grids/ 5.43 acres | 48 grids/ 3.45 acres | 6,972 | 91 | 1,524 |



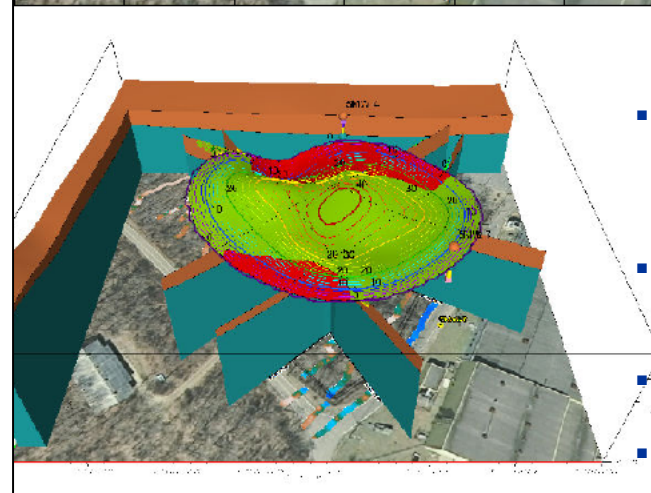
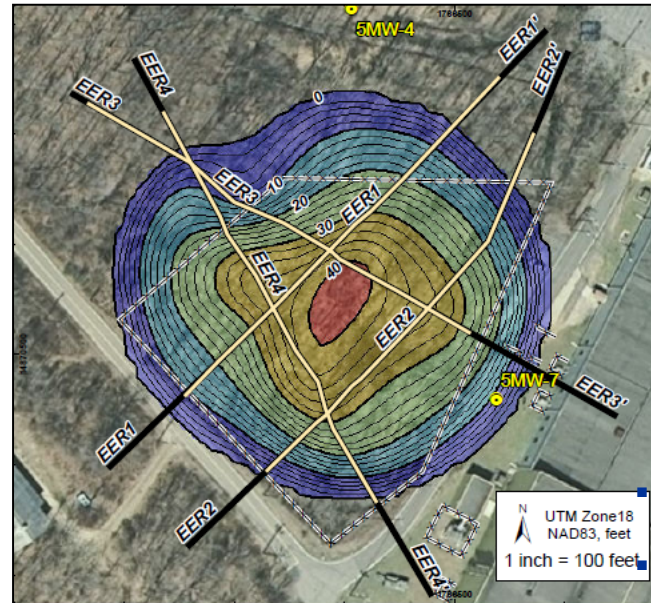
Military Munitions Response Program

Shell Burial Grounds

West



East



Legend

Map View

- Well Locations
- Resistivity Transect
- Geologic Section Line
- Fenceline
- Crater Depth (feet)
- < 10
- 10 - 20
- 20 - 30
- 30 - 40
- > 40

Shell Burial Grounds - West

Pit 1: 30 ft deep and contains ~33,000 cubic yards of material.

Pit 2: 15 ft deep and contains ~28,000 cubic yards of material.

Cap material averages 4 - 5 ft.

Shell Burial Grounds - East

40 ft deep and contains ~80,000 cubic yards of material.

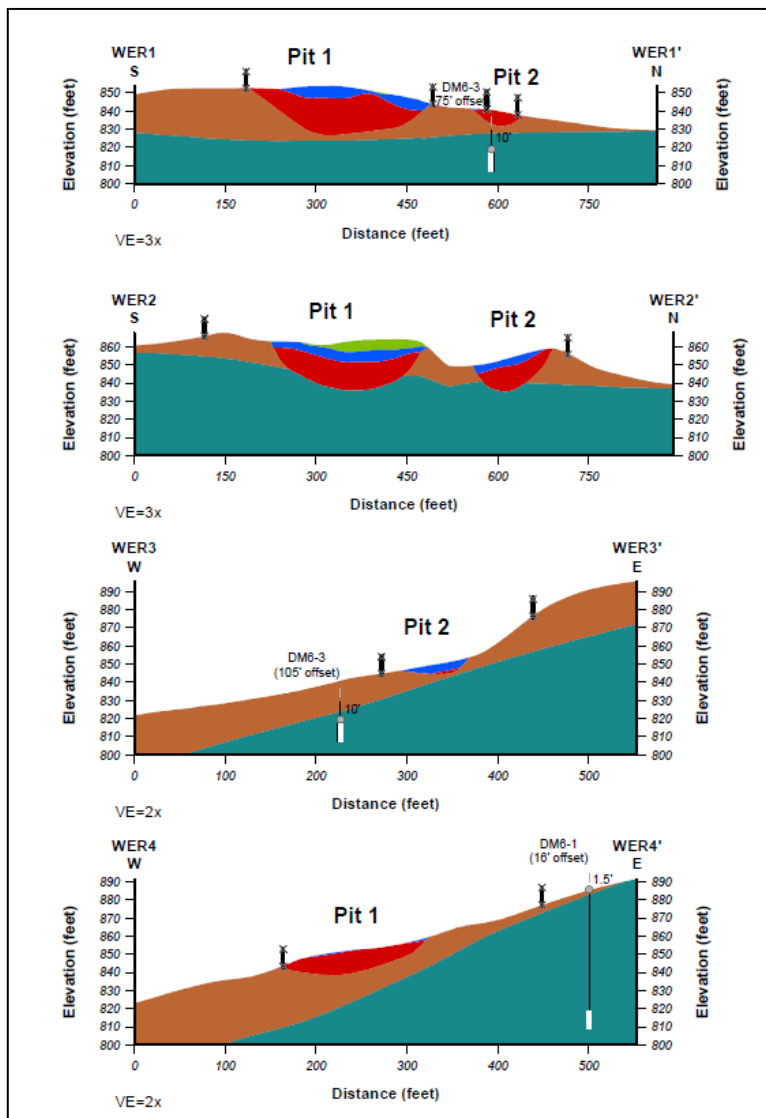


Military Munitions Response Program

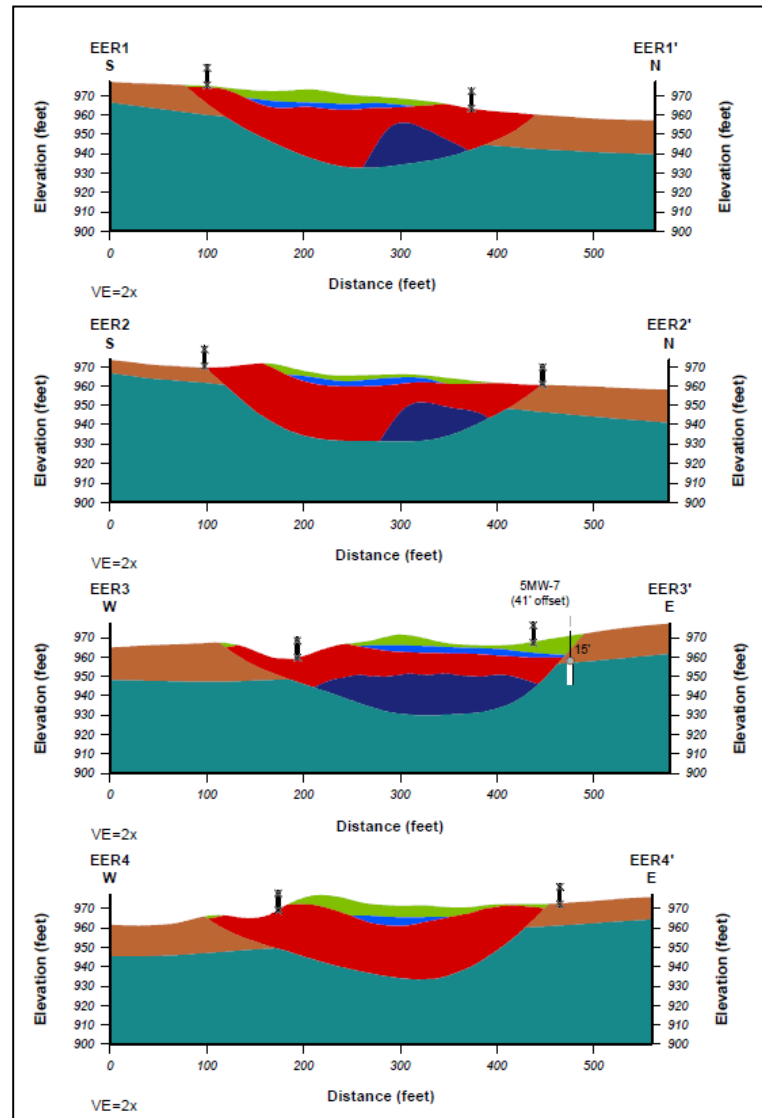
Shell Burial Grounds



West



East

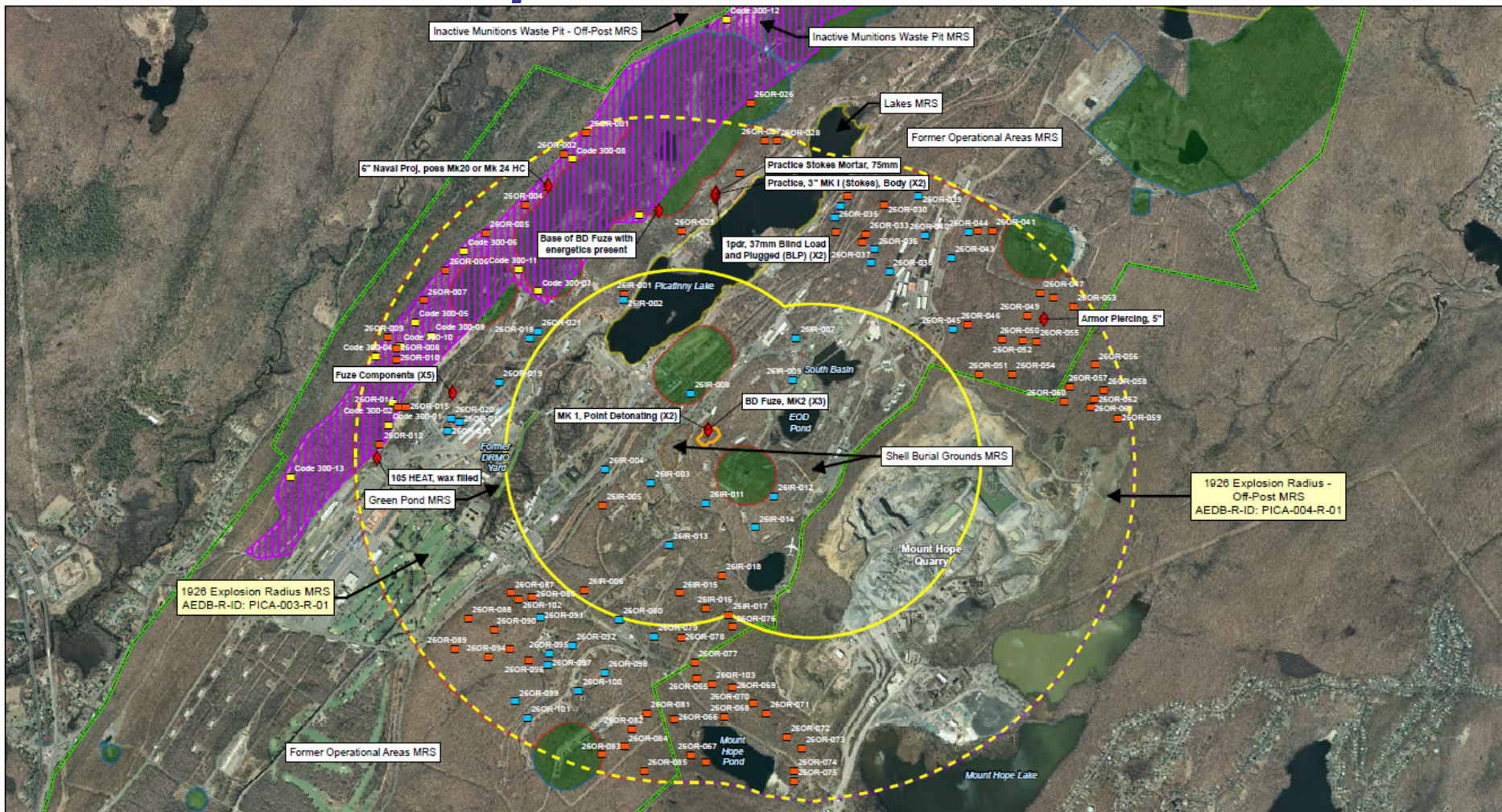




Military Munitions Response Program

1926 Explosion Radius

1926 Explosion Radius - Off-Post



| | | | | | | | |
|--|---|---|---|--|--|----------------------------|--|
| Legend | Munitions Response Sites | Former Operational Areas | Fuze Area | NOTES: Base Imagery: NJ 2007 Natural Color Imagery Data Source: Army GIS Layers (August 2011) Coordinate System: New Jersey State Plane Datum: NAD83. Units: Feet | Picatinny Arsenal Morris County, New Jersey | WESTON SOLUTIONS | Figure 6-4 1926 Explosion Radius MRS MEC Finds |
| <ul style="list-style-type: none">Installation BoundaryOperational Range AreaInner Radius BoundaryOuter Radius Boundary | <ul style="list-style-type: none">1926 Explosion Radius1926 Explosion Radius - Off-PostInactive Munitions Waste PitInactive Munitions Waste Pit - Off-Post | <ul style="list-style-type: none">Green PondLakesShell Burial Grounds | <ul style="list-style-type: none">Code 300 Area Grid (all Analog)Other Analog GridDGM GridUXO/DMM/MPPEH Find | | | | |
| | | | | | | | |
| | | | | | Created By: CEP Verified By: XXX Approved By: XXX | | 6/27/2013 Contract #: W912OR-09-D-0006 DC 0002 <small>\\arcadisus.com\officedata\WhitePlains-NY\WHL_GIS\GIS_data\Projects\ARMY\Installations\Picatinny_Arsenal\MMRP_RI\MapDocs\Figure_6-2.mxd</small> |



Military Munitions Response Program

Green Pond

Former DRMO Yard



Legend

- Former DRMO Yard
- Green Pond MRS
- Cultural Debris
- Geology
- UXO Finds Map Items
- Munitions Debris
- UXO
- Munitions Debris
- MEC

Note: Some Munitions Debris items were identified at the same locations

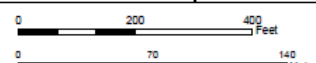
SOURCE:

Base Imagery: NJ 2012 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)
Coordinate System: UTM Zone 18N
Datum: WGS84. Units: Feet

Picatinny Arsenal
Morris County,
New Jersey



Figure 6-1
Green Pond Brook MRS
Intrusive Results



Created By: CLR
Verified By: NAS
Approved By: RSS

12/5/2013

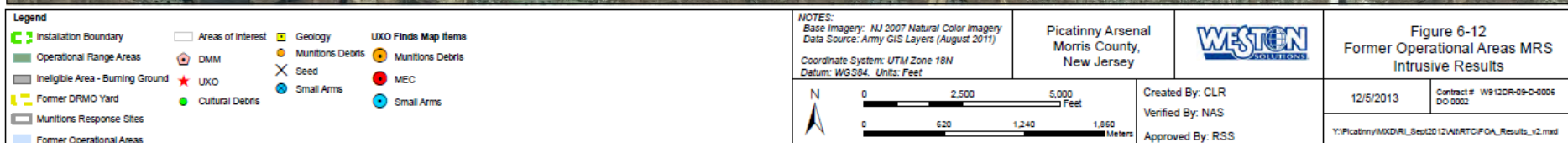
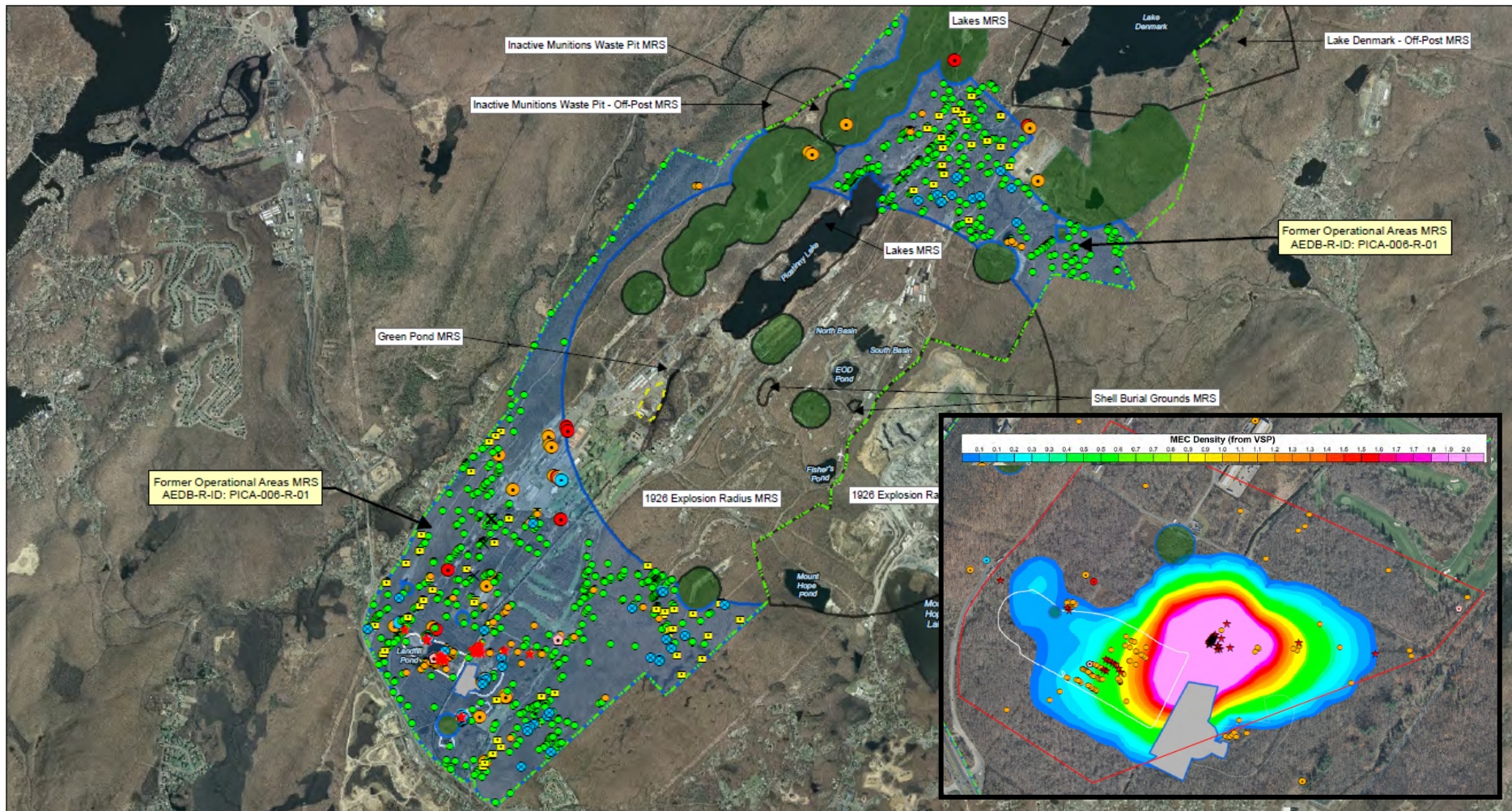
Contract # W912DR-09-D-0006
DD 0002

Y:\Picatinny\MXD\RI_Sep2013\ARITC\Greenpond_DRMO_Yard_Results_v2.mxd



Military Munitions Response Program

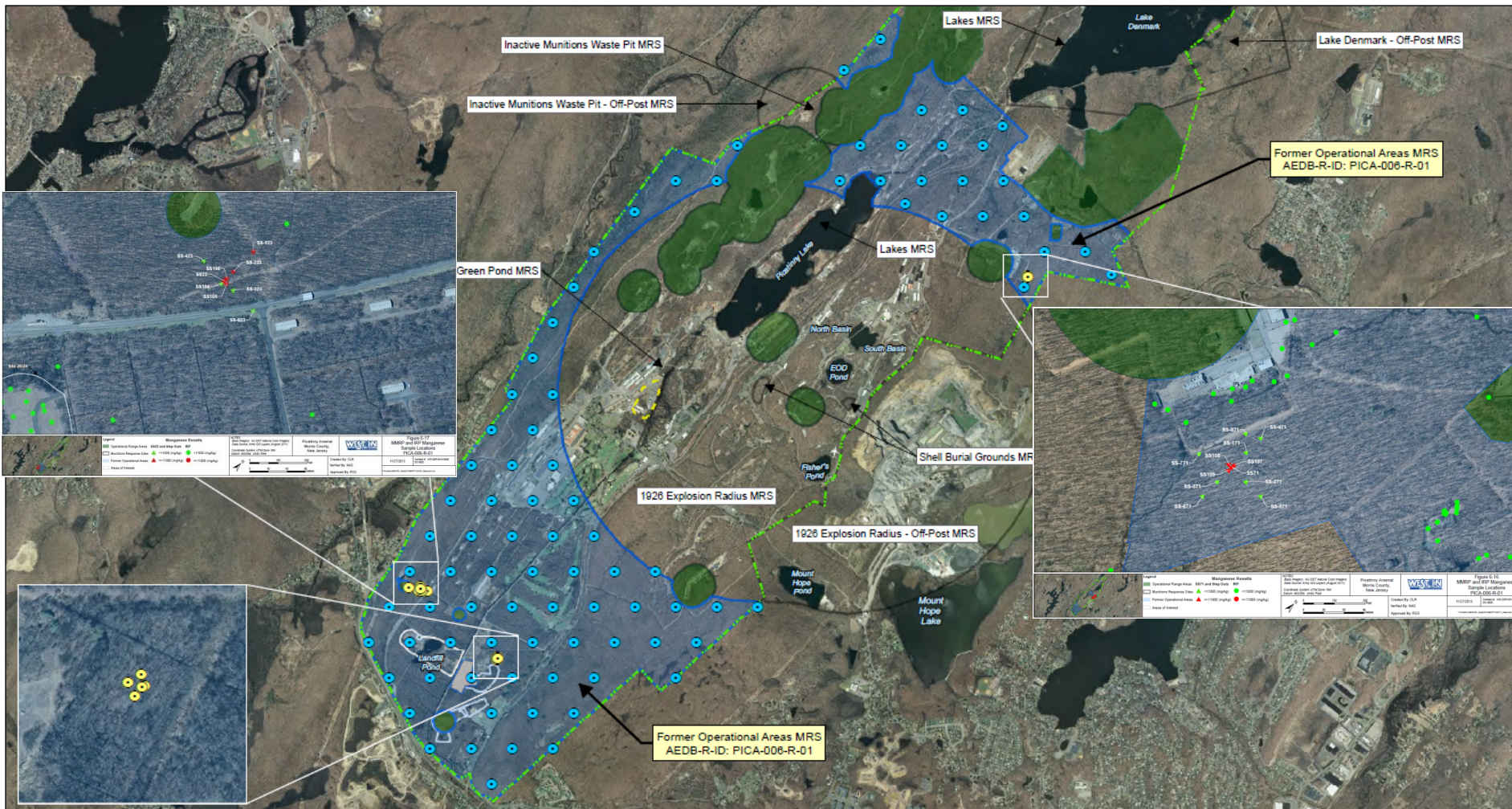
Former Operational Areas





Military Munitions Response Program

Former Operational Areas



| | | | |
|--|--------------------------|--|----------------------------------|
| | Installation Boundary | | Ineligible Area - Burning Ground |
| | Operational Range Areas | | Former DRMO Yard |
| | Munitions Response Sites | | MC Sampling Locations |
| | Former Operational Areas | | Step-Out Sampling Locations |
| | Areas of Interest | | |

NOTES:
Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)
Coordinate System: UTM Zone 18N
Datum: WGS84. Units: Feet

Picatinny Arsenal
Morris County,
New Jersey



Figure 5-30
Former Operational Areas MRS
MC Sampling Locations

Created By: CLR
Verified By: NAS
Approved By: RSS

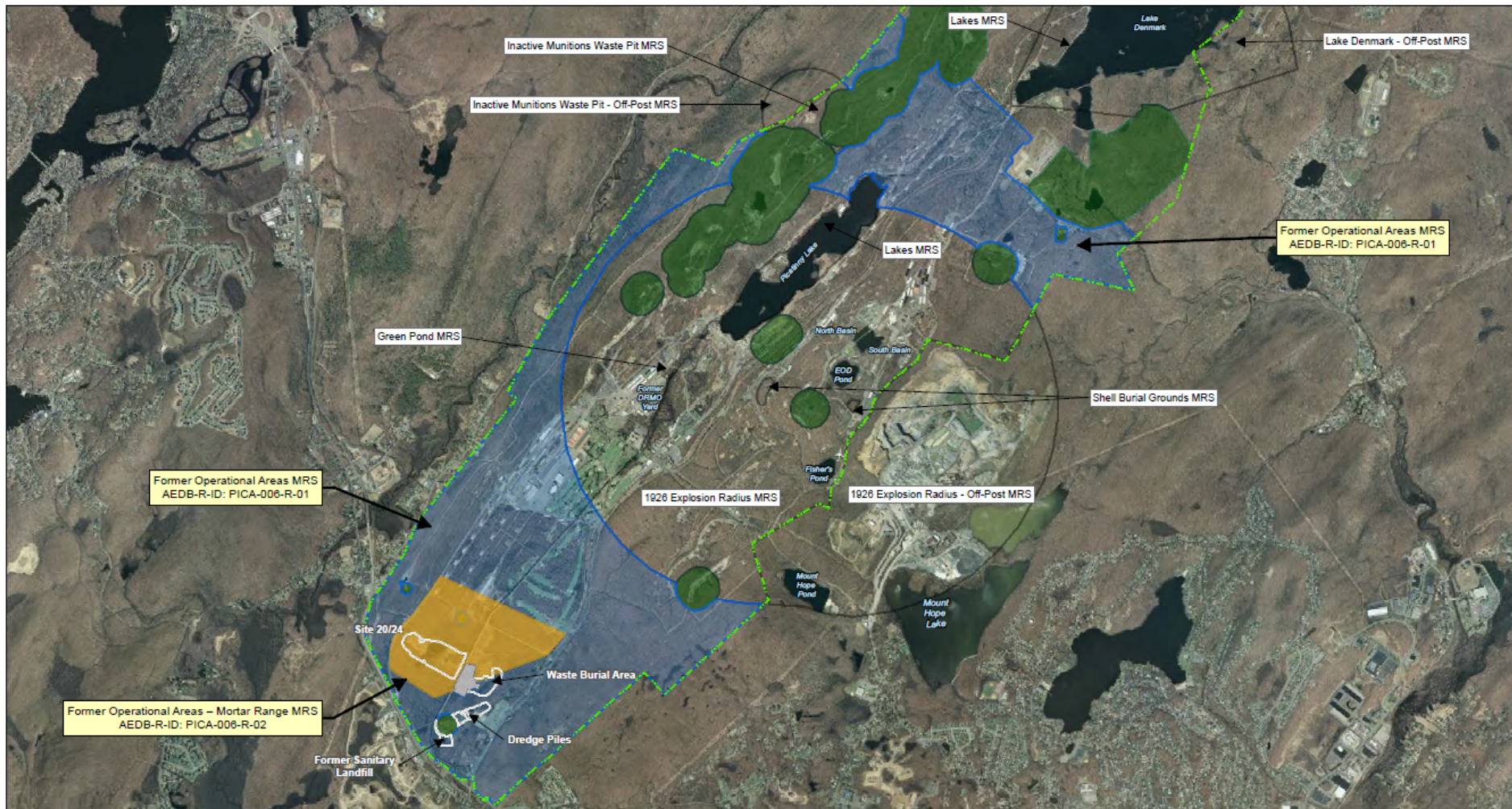
10/24/2013 Contract # W912DR-09-D-0006
DO 0002

Y:\Picatinny\MXD\RL_Sep2012\A\RTCI\FOA_MC_Sampling.mxd



Military Munitions Response Program

Former Operational Areas



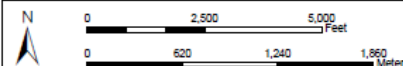
| Legend | |
|--------|----------------------------------|
| | Installation Boundary |
| | Mortar Range MRS |
| | Operational Range Areas |
| | Ineligible Area - Burning Ground |
| | Munitions Response Sites |
| | Former Operational Areas |
| | Areas of Interest |

NOTES:
Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)
Coordinate System: UTM Zone 18N
Datum: WGS84. Units: Feet

Picatinny Arsenal
Morris County,
New Jersey



Figure 11-2
Recommended MRS Division
PICA-006-R-01 and PICA-006-R-02



Created By: CLR
Verified By: NAS
Approved By: RSS

11/15/2013

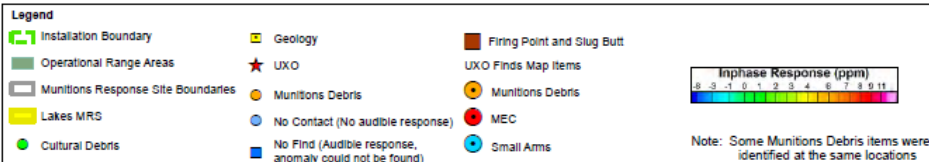
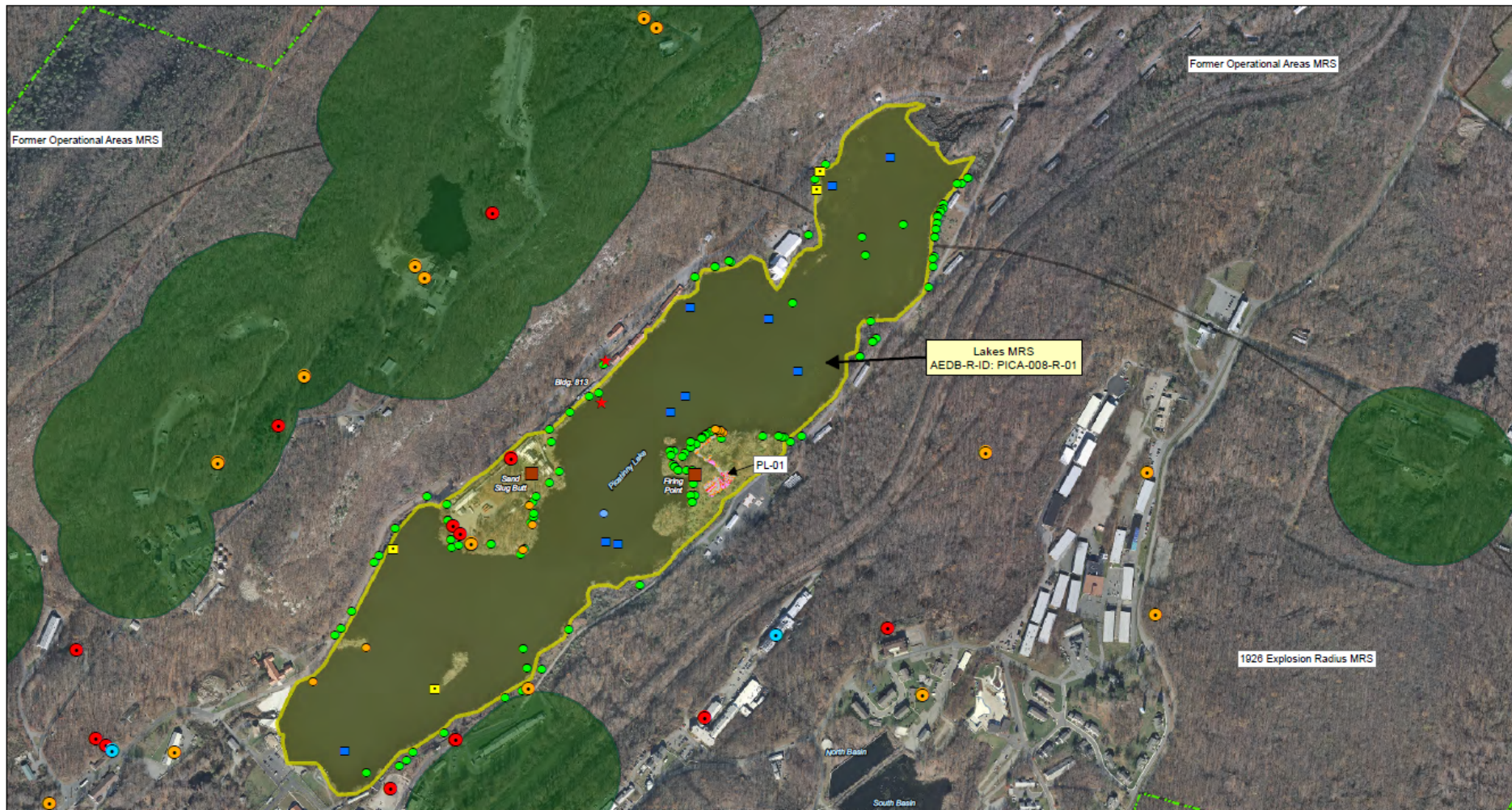
Contract # W912DR-09-D-0006
DD 0002

F:\Picatinny\MOCD\11_Sep2012\ARRT\CPA_MRS_Recommend_Division.mxd



Military Munitions Response Program

Lakes - Picatinny Lake



SOURCE:
Base Imagery: NJ 2012 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)
Coordinate System: UTM Zone 18N
Datum: WGS84. Units: Feet

Picatinny Arsenal
Morris County,
New Jersey



Created By: CLR
Verified By: NAS
Approved By: RSS

Figure 6-19
Lakes MRS - Picatinny Lake Portion
Intrusive Results

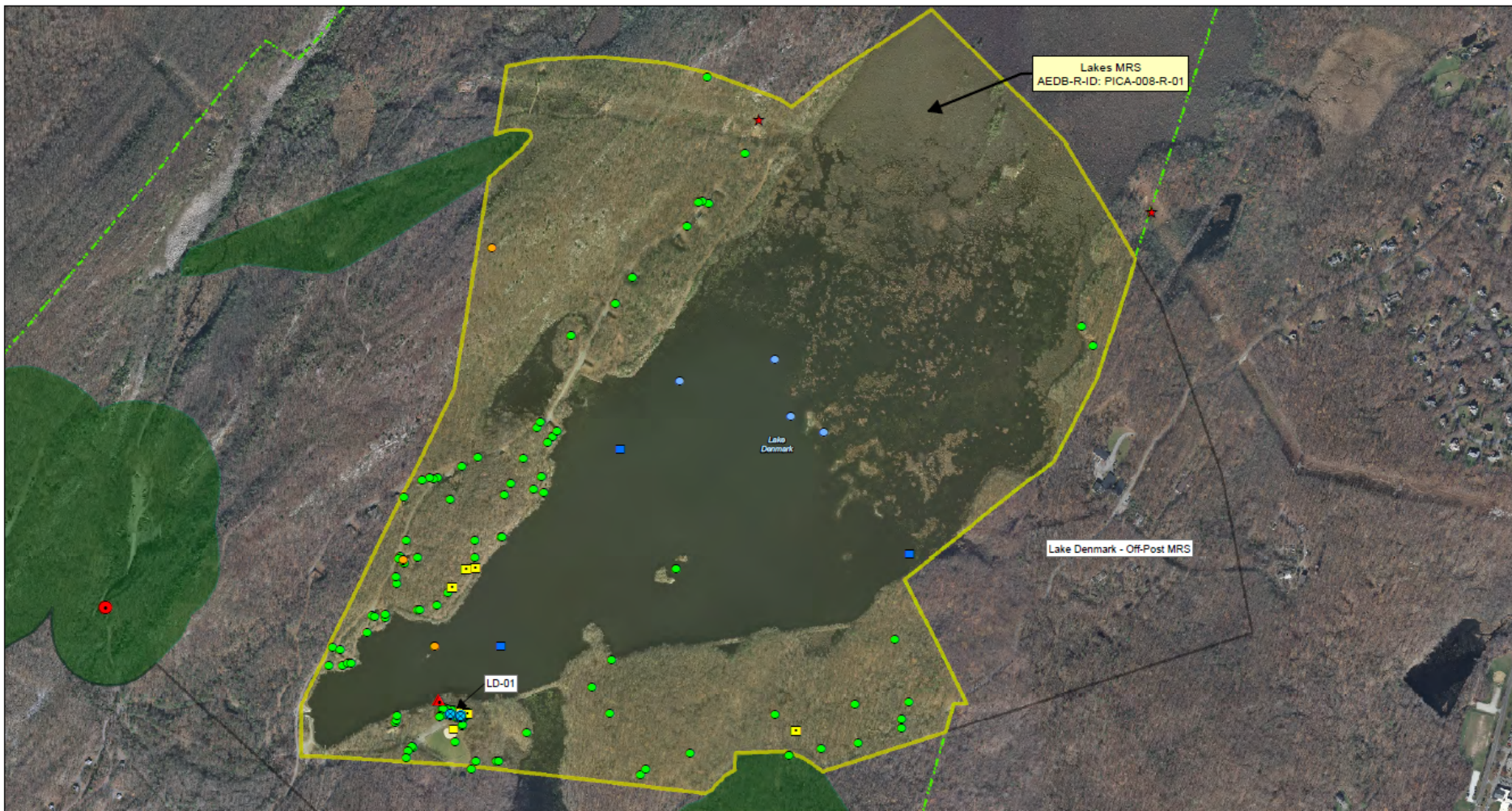
Date: 12/5/2013 Contract No: W912DR-09-D-0026
DO 0032

File: Y:\Picatinny\MSDR\1_Sep2012\AR\TC\Picatinny_Lake_Results_v2.mxd



Military Munitions Response Program

Lakes - Lake Denmark

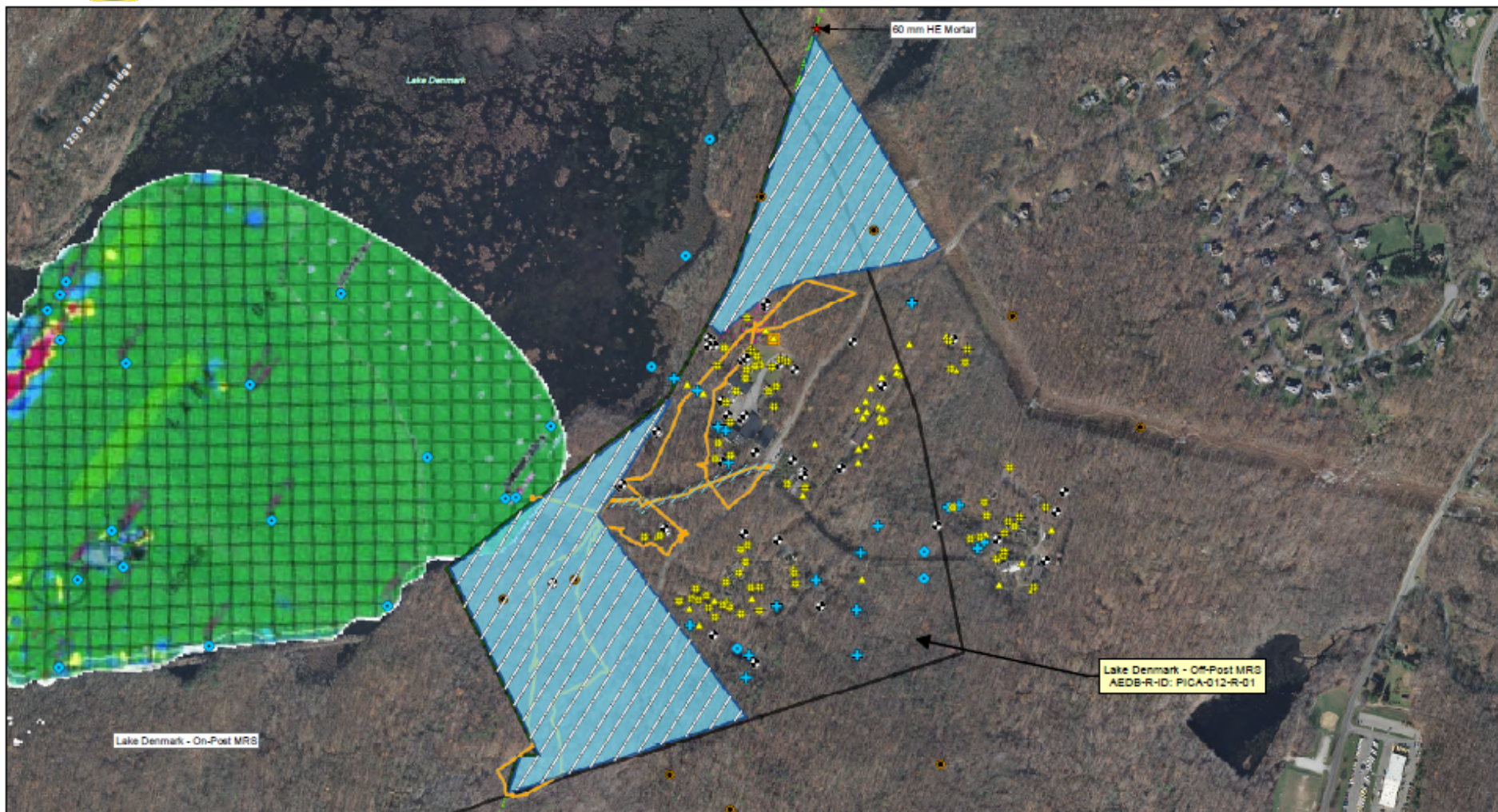


| | | | | | | | | | |
|------------------------------------|----------------------------------|---|-----------------------------------|---|--|---|--|--|--|
| Legend | | SOURCE: Base Imagery: NJ 2012 Natural Color Imagery Data Source: Army GIS Layers (August 2011) Coordinate System: UTM Zone 18N Datum: WGS84. Units: Feet | | Picatinny Arsenal Morris County, New Jersey | | WESTON SOLUTIONS | | Figure 6-20 Lakes MRS - Lake Denmark Portion Intrusive Results | |
| Installation Boundary | Cultural Debris | No Find (Audible response, anomaly could not be found) | Mortar recovered during PG&E work | 0 750 1,500 Feet 0 250 500 Meters | | Created By: CLR Verified By: NAS Approved By: RSS | | Date: 12/5/2013 Contract # W912OR-09-D-0006 DO 0002 File: Y:\Picatinny\MOX\RI_Sep2012\WRTCLake_Denmark_Results_v2.mxd | |
| Operational Range Areas | Munitions Debris | Mortar recovered during USACG 2010 Site Walk | MEC | | | | | | |
| Munitions Response Site Boundaries | Geology | UXO Finds Map Items | | | | | | | |
| Lakes MRS | Small Arms | | | | | | | | |
| Grid Boundary | No Contact (No audible response) | | | | | | | | |



Military Munitions Response Program

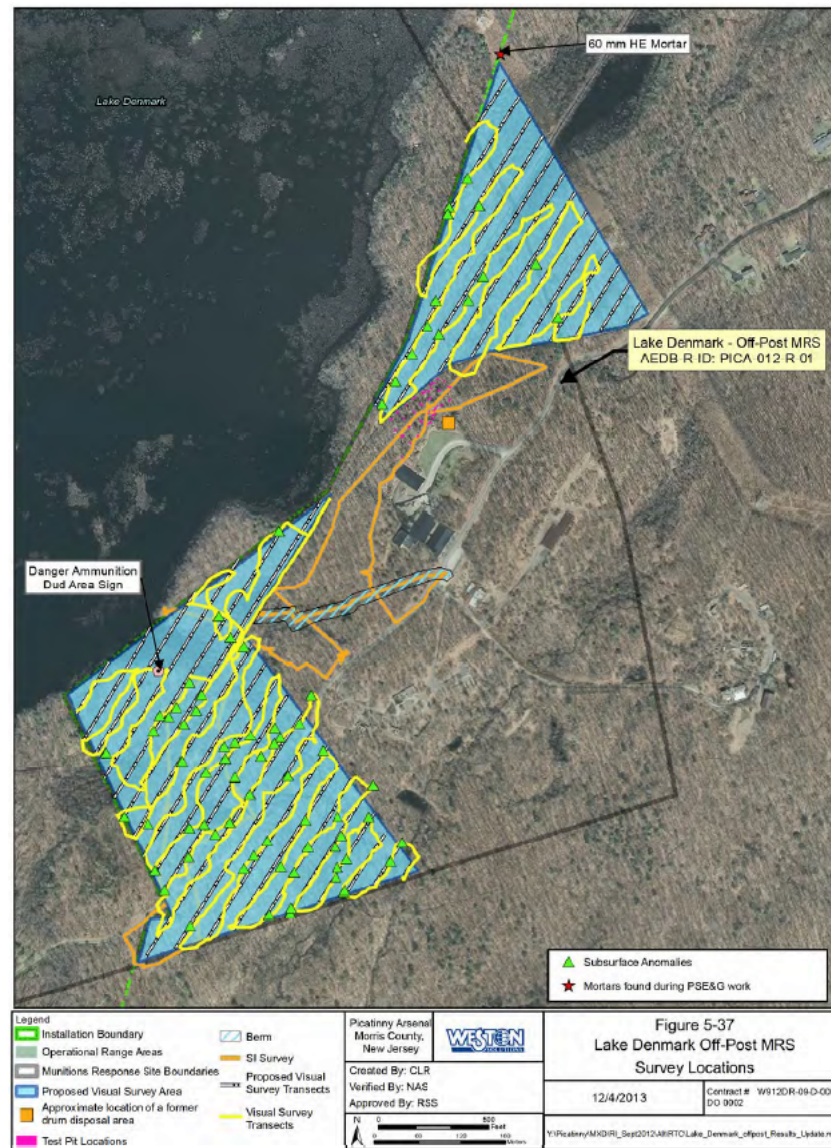
Lake Denmark - Off-Post





Military Munitions Response Program

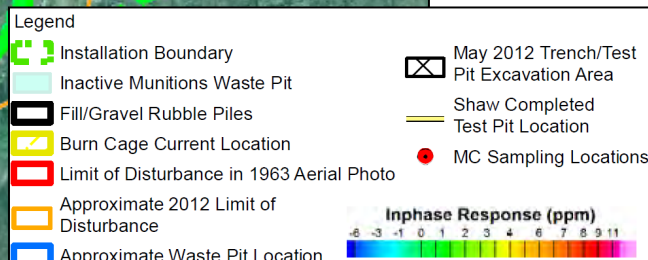
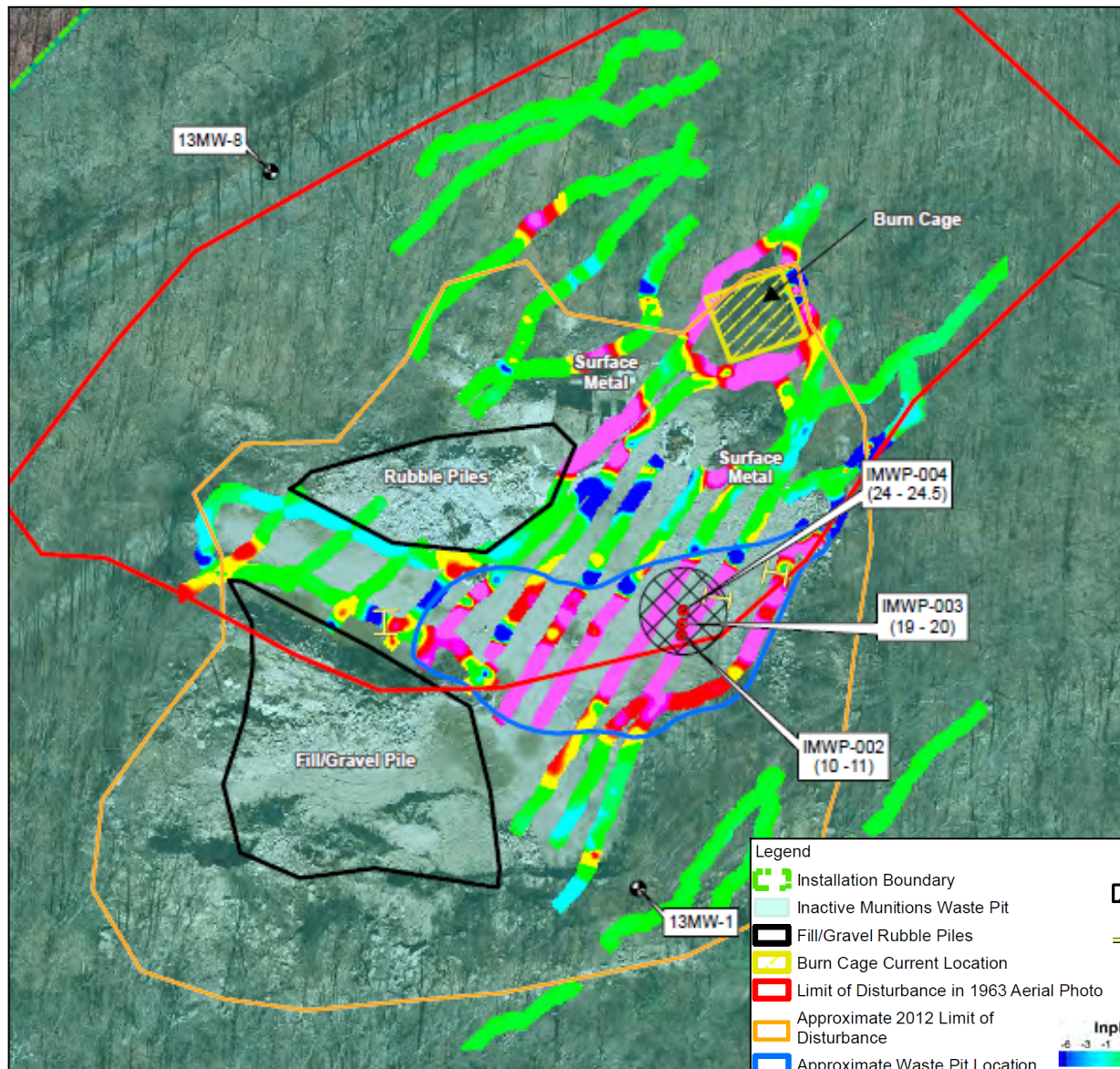
Lake Denmark - Off-Post





Military Munitions Response Program

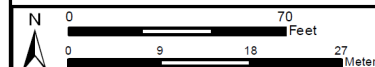
Inactive Munitions Waste Pit



Picatinny Arsenal
Morris County,
New Jersey



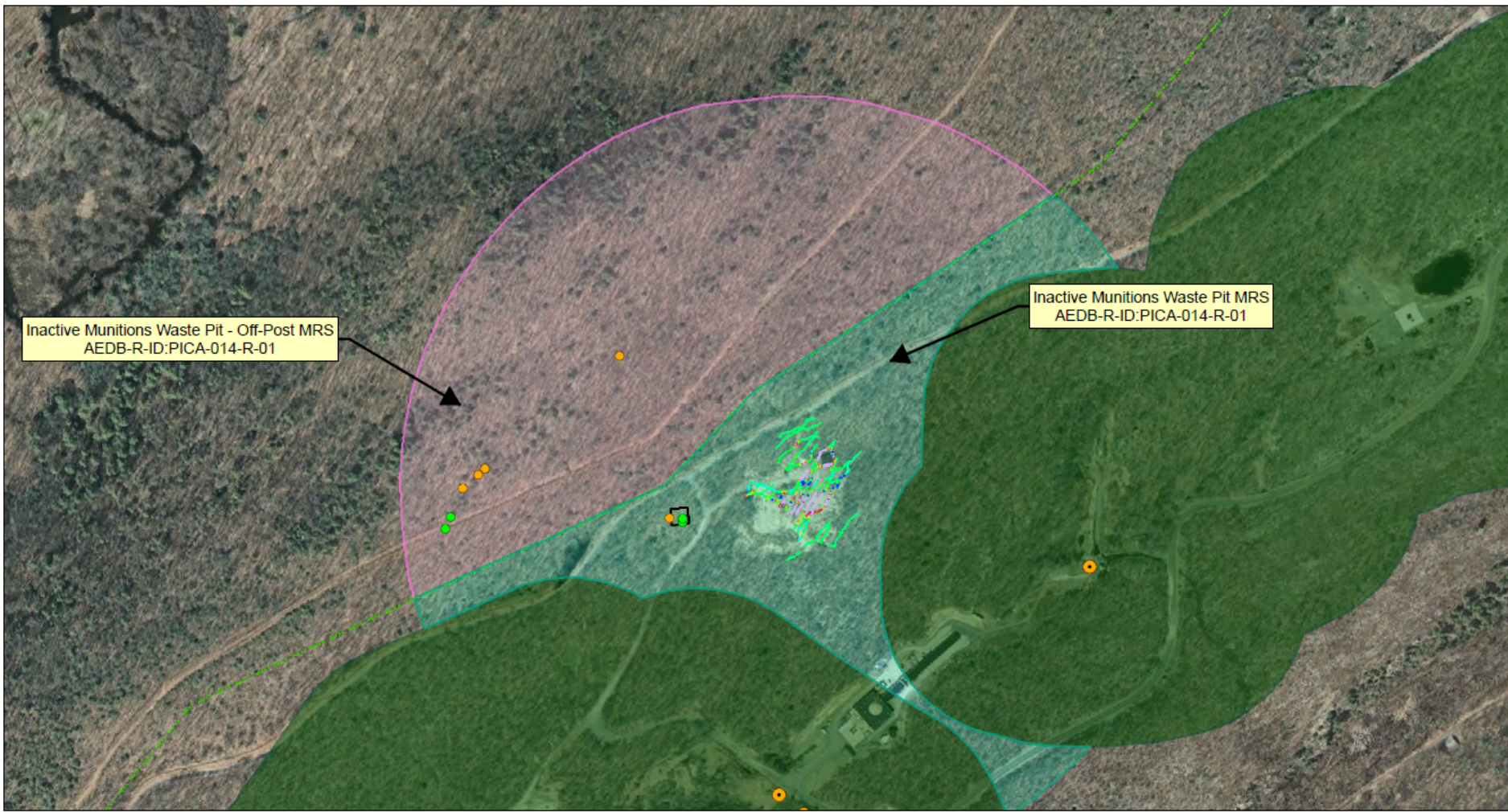
Created By: CLR
Verified By: NAS
Approved By: RSS





Military Munitions Response Program

Inactive Munitions Waste Pit - Off-Post



| | | | | | | | | | | | | | |
|--|--|---|--|---|--|--|--|---|--|--|--|---|--|
| Legend <ul style="list-style-type: none">Installation BoundaryOperational Range AreasMunitions Response SitesInactive Munitions Waste PitInactive Munitions Waste Pit - Off-PostGrid Boundary | | <ul style="list-style-type: none">Cultural DebrisMunitions DebrisUXO Finds Map ItemsMunitions Debris | | Inphase Response (ppm) 8 -3 -1 0 1 2 3 4 6 7 8 9 11 | | NOTES: Base Imagery: NJ 2007 Natural Color Imagery Data Source: Army GIS Layers (August 2011) Coordinate System: UTM Zone 18N Datum: WGS84. Units: Feet | | Picatinny Arsenal Morris County, New Jersey | | WESTON SOLUTIONS | | Figure 6-27 Inactive Munitions Waste Pit MRS Intrusive Results | |
| | | | | | | Created By: CLR Verified By: NAS Approved By: RSS | | 12/4/2013 | | Contract # W9120R-09-D-0006 DD 0002 | | File: Y:\Picatinny\MXD\RI_Sep2012\AIR\RTG\IMWF_Results_v2.mxd | |

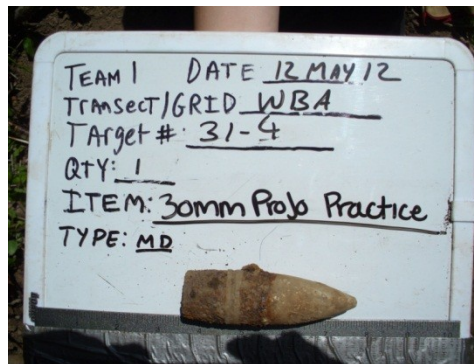


Military Munitions Response Program

Investigation Analysis



- MEC Hazard Assessments (MECHA) and MEC probability assessment.
- Risk assessments for MC.
- MRSPP updates for each MRS.





Military Munitions Response Program

Investigation Conclusions



| Munitions Response Site (MRS) | MEC Assessment | MC Assessment | MRSP | Feasibility Study |
|--|-------------------------------------|-------------------------------|--|---|
| 1926 Explosion Radius | Exposure pathways complete. | Exposure pathways incomplete. | 3 | Address explosive hazards. |
| Fuze Area** | Exposure pathways complete. | Exposure pathways incomplete. | 3 | Address explosive hazards. |
| 1926 Explosion Radius - Off-Post | Exposure pathways complete. | Exposure pathways incomplete. | 4 | Address explosive hazards. |
| Shell Burial Grounds | Exposure pathways complete. | Exposure pathways incomplete. | 5 | Address explosive hazards. |
| Green Pond | Combined with 1926 Explosion Radius | | | |
| Former Operational Areas | Exposure pathways complete. | Exposure pathways incomplete. | 3 | Address explosive hazards. |
| Mortar Range** | Exposure pathways complete. | Exposure pathways incomplete. | 3 | Address explosive hazards. |
| Lakes MRS | Exposure pathways complete. | Exposure pathways incomplete. | 4 | Address explosive hazards. |
| Lake Denmark - Off-Post | Exposure pathways incomplete. | Exposure pathways incomplete. | No Known or Suspected MEC, CWM, or MC Hazard | Assess No Active Remediation Alternative. |
| Inactive Munitions Waste Pit | Exposure pathways complete. | Exposure pathways incomplete. | 4 | Address explosive hazards. |
| Inactive Munitions Waste Pit - Off-Post | Exposure pathways incomplete. | Exposure pathways incomplete. | No Known or Suspected MEC, CWM, or MC Hazard | Assess No Active Remediation Alternative. |

Note: ** New MRS